Understanding the Downward Trend in Labor Income Shares

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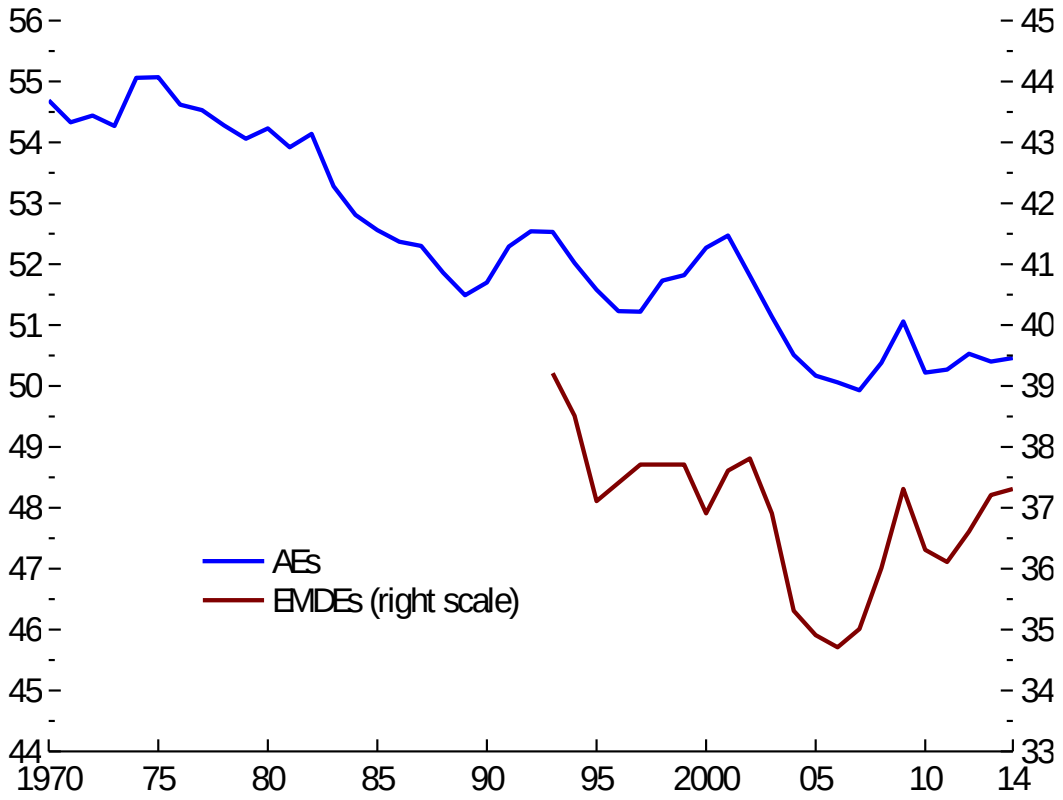
with contributions from Jihad Dagher and support from Ben Hilgenstock and Hao Jiang

The global labor share of income has been on a downward trend…

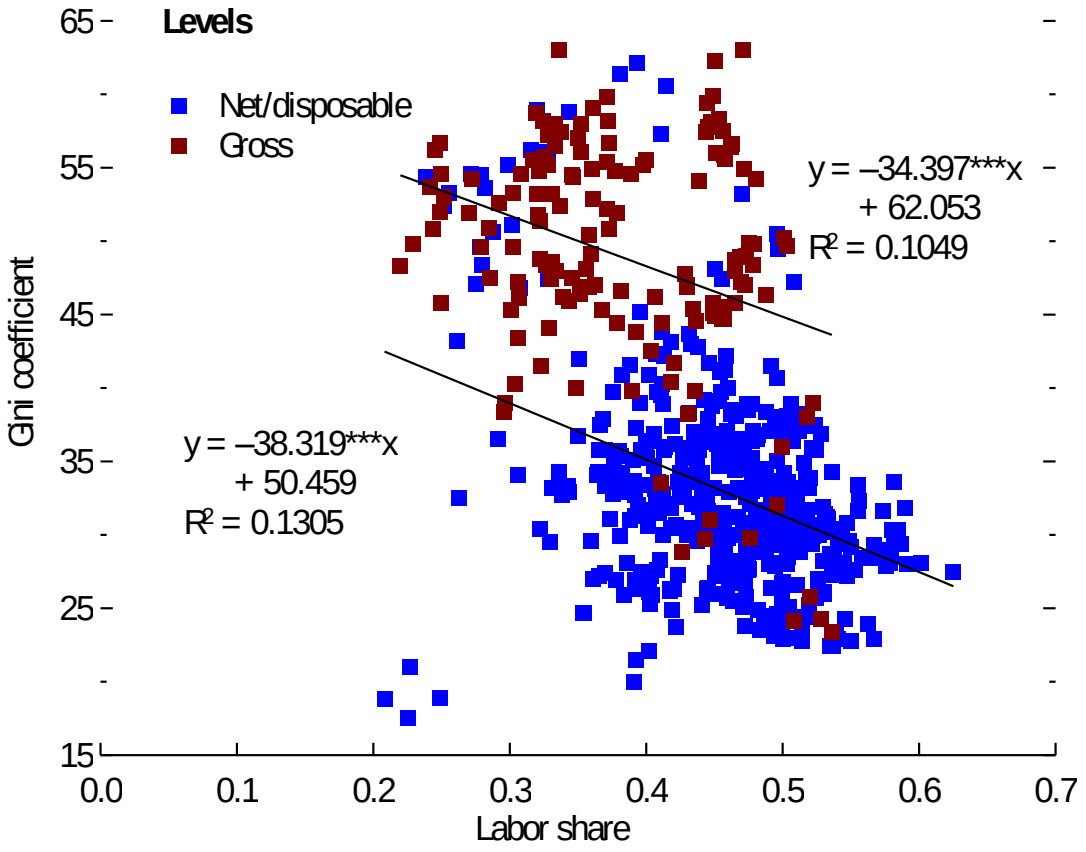
Evolution of the Labor Share of Income

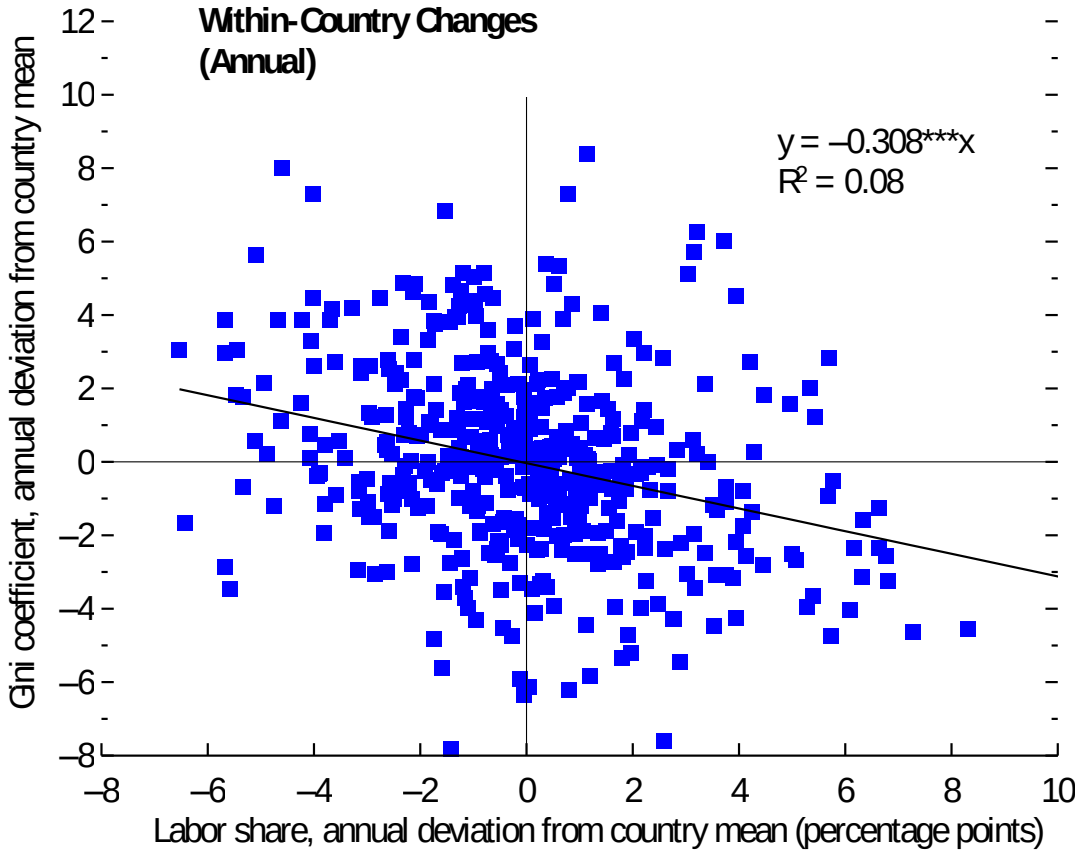
(Percent)



Declining labor shares are associated with rising inequality.

Labor Shares and Income Inequality





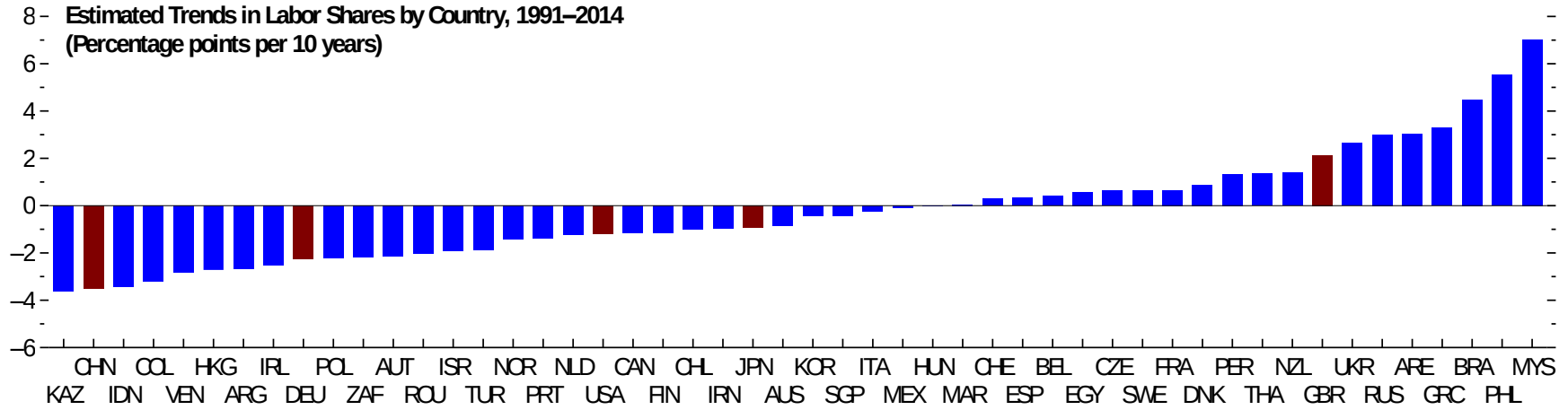
Central Questions

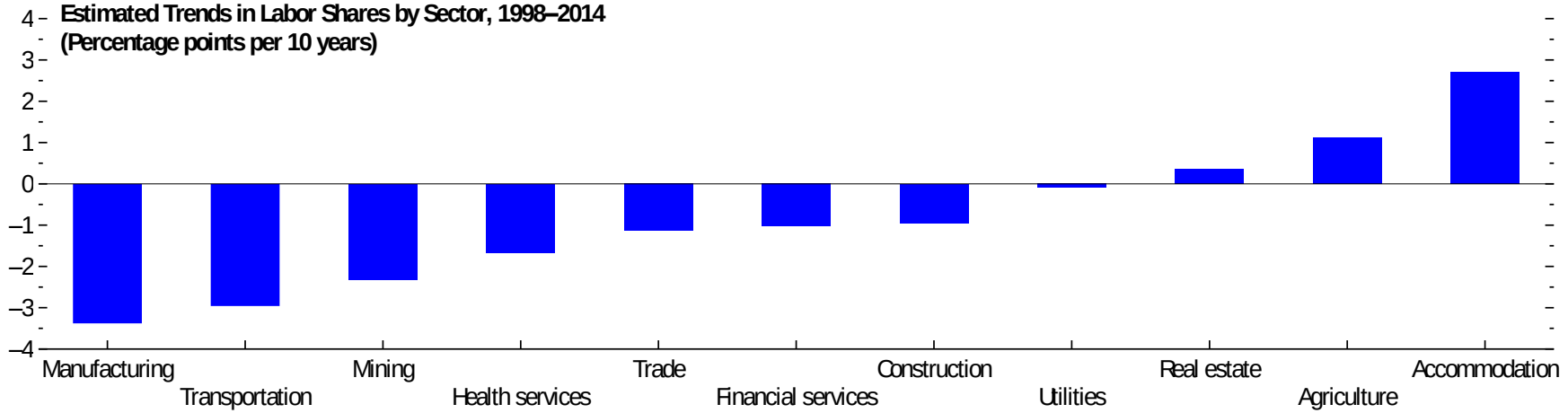
- How widespread is the decline in the labor share of income? To what extent have trends in labor income shares differed across countries, industries and skill groups?
- What are the key drivers of the labor share of income and through which mechanisms do they operate?
- Do the drivers vary between advanced economies (AEs) and emerging market and developing economies (EMDEs), industries, and skill groups?
- How have technological advancement and global integration affected labor shares? What has been the role of exposures to routinization and participation in global value chains (GVCs) in declining labor shares?

How Widespread is the Decline in the Labor Share of Income?

Heterogeneity across countries and sectors…

Estimated Trends in Labor Shares by Country and Sector

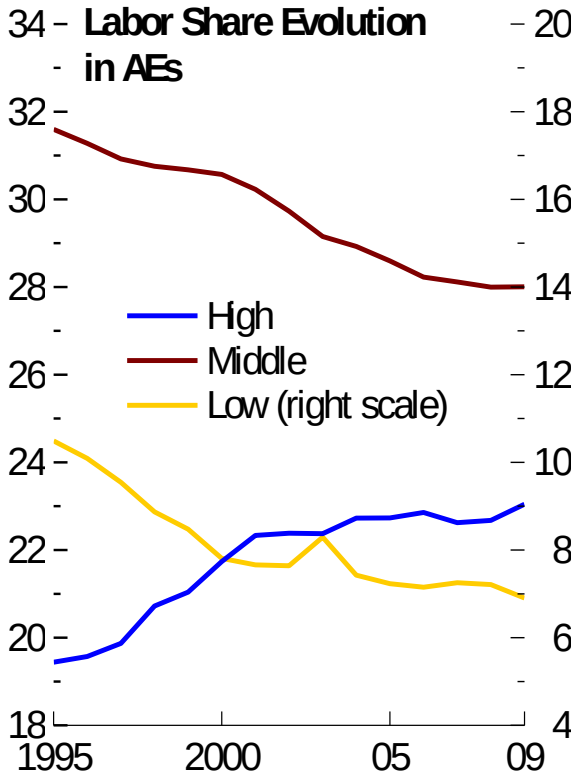


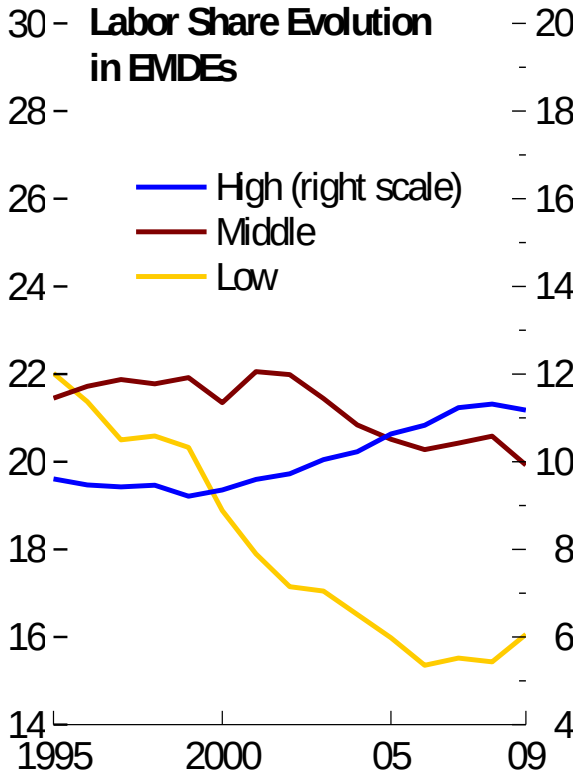


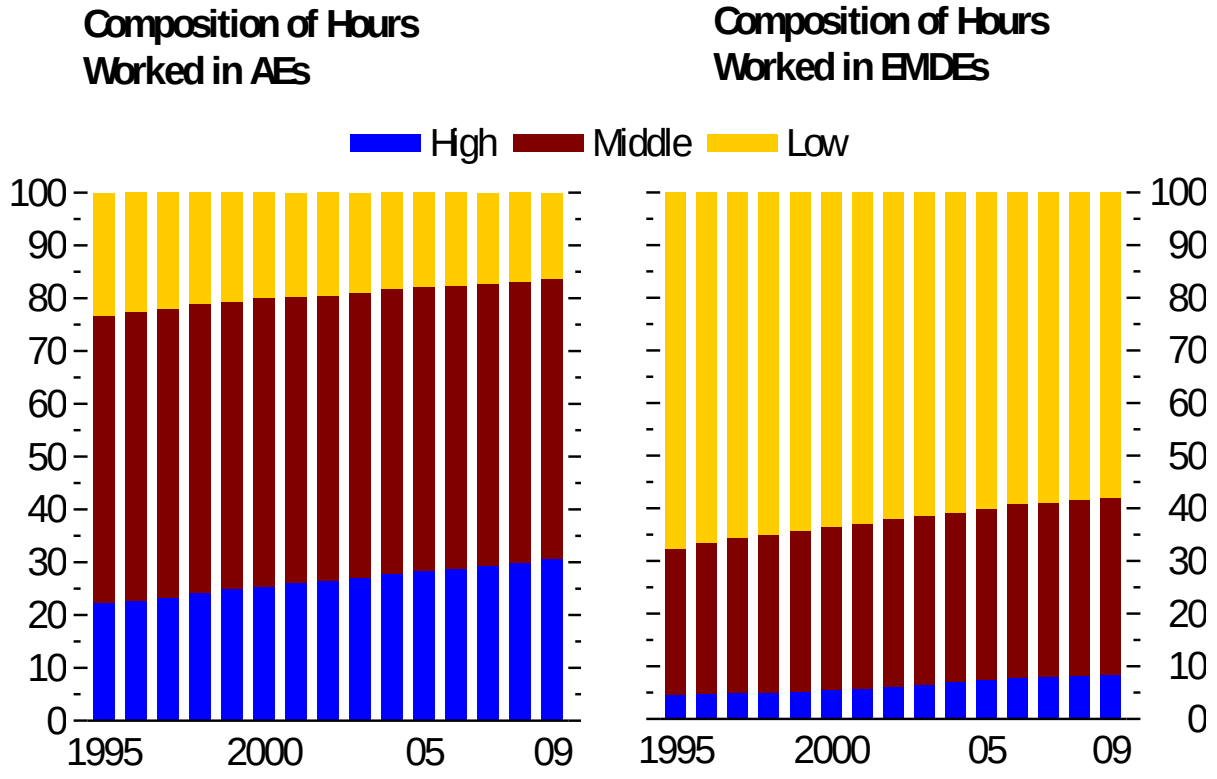
…and across skill levels, with a most pronounced decline among the medium-skilled.

Labor Share Evolutions and Labor Force Composition by Skill Level

(Percent)







What are the Key Drivers of the Labor share of Income?

A key parameter that influences labor shares is the elasticity of substitution between capital and labor.

$$\text{Labor share (LS)} = \frac{\text{wage} \times \text{employment}}{\text{wage} \times \text{employment} + \text{rental rate} \times \text{capital stock} + \text{profits}}$$

Cobb-Douglass: EoS=1 => stable LS

CES: EOS $\in (0, \infty)$

- Tasks with EoS>1 automated; technological advances ↓ cost of capital ↓ LS
- Tasks with EoS<1 offshored ↓ LS

Changes in labor shares could be driven by:

- **Technology**
  - ↓ relative price of investment goods and cost of automating routine tasks
  - substitution of labor by capital ↓LS if EoS>1, i.e. larger effect if more automatable/routinizeable
- **Global integration**
  - *Trade in final goods:* specialization in comp. adv. sectors ↓LS in AEs, ↑LS in EMs
  - *Participation in global value chains*: ↓LS in AEs *and* EMs
  - *Financial integration*
    - Higher capital mobility ↓LS in AEs (lower labor bargaining power);
    - Lower cost of capital ↑LS in EMs.
- **Policy and Institutions**
  - ↓ corporate taxation ↑ after-tax return on capital↓ LS;
  - ↓ unionization ↓ bargaining power of labor ↓ LS;
  - if labor and product market (de)-regulation ↑ producer rents and markups ↓ LS;
- **Measurement Issues** (self-employment; depreciation of capital)

…and will depend on exposures to routinization.

- Routine occupations: easily codified or programmed so they can be executed by a machine; easily automated (substitutable by ICT capital).
- Higher initial exposure of economy/industry to routinizable jobs → greater substitution of labor for capital as the price of capital goods declines → larger decline in labor share.

- Construct sectoral and economy-wide exposures to routinization:
  - occupations are scored on how routine they are (Autor and Dorn 2013)
  - routinization exposures are employment-weighted scores:

SECTORAL: $RTI_{sct} = \sum_{o=1}^{N} \omega_{osct} \times RTI_o$

ECONOMY: $RTI_{ct} = \sum_{o=1}^{N} \omega_{oct} \times RTI_o$

ω_{osct}: employment share of occupation *o*, sector *s*, country *c* at time *t*

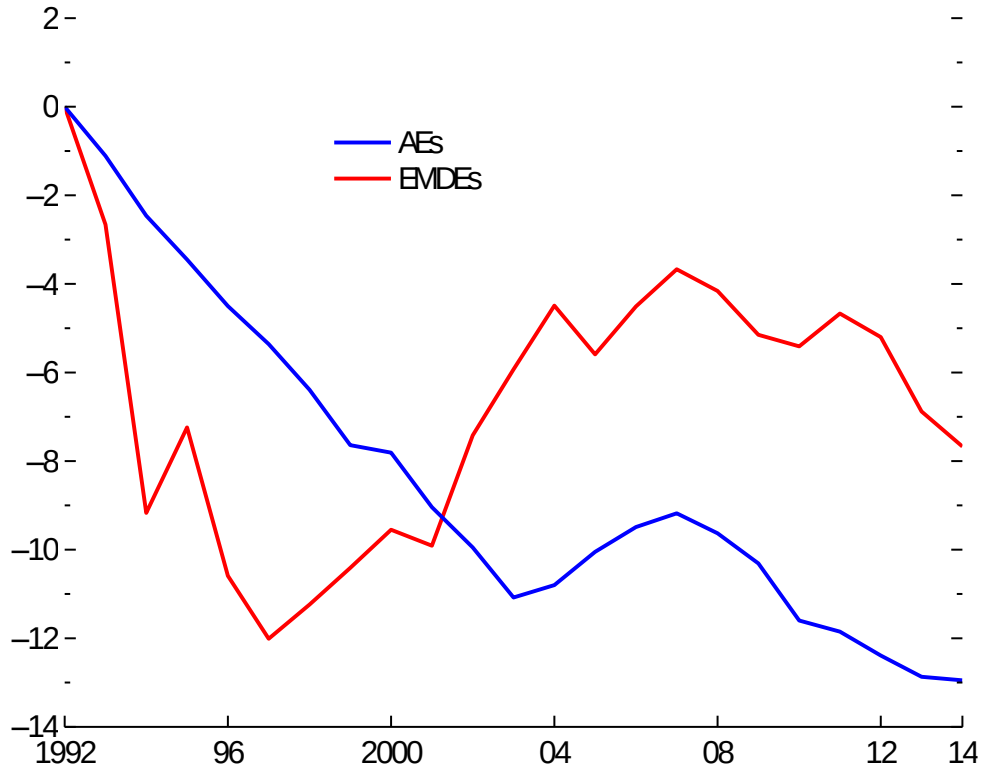
ω_{oct} employment share of occupation *o*, country *c* at time *t*;

RTI_o: routinization score

The relative price of investment declined more in AEs than in EMDEs…

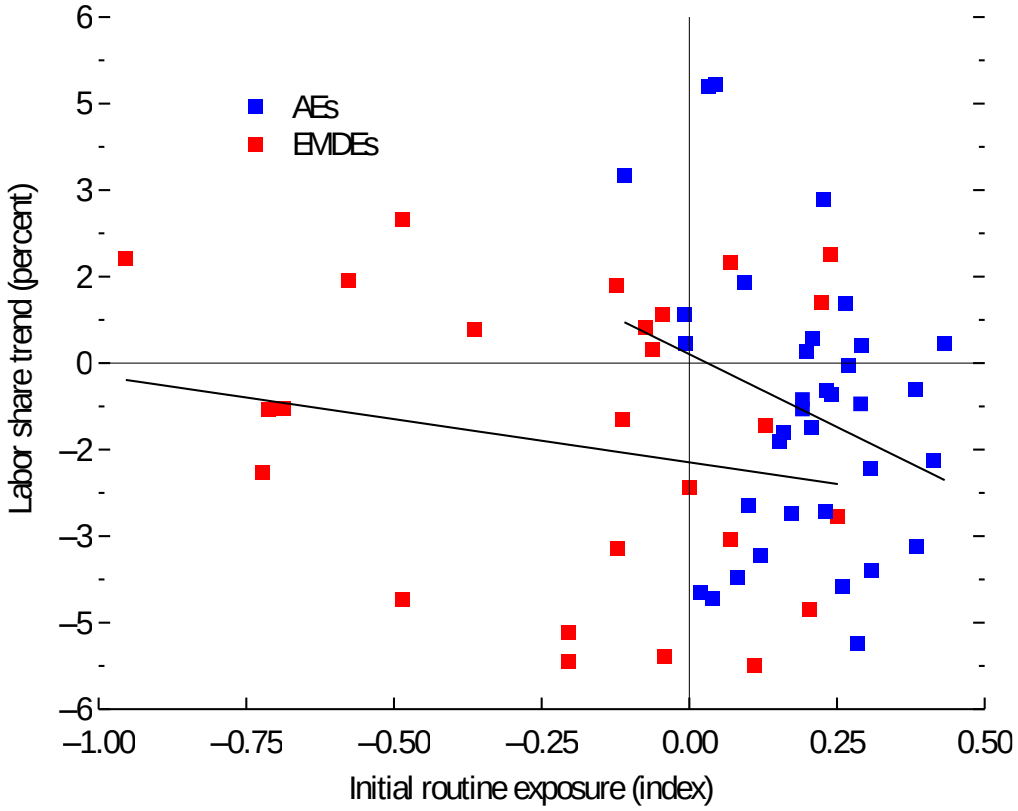
Trends in Potential Drivers of Labor Shares: Relative Price of Investment

(Percent change relative to 1990)



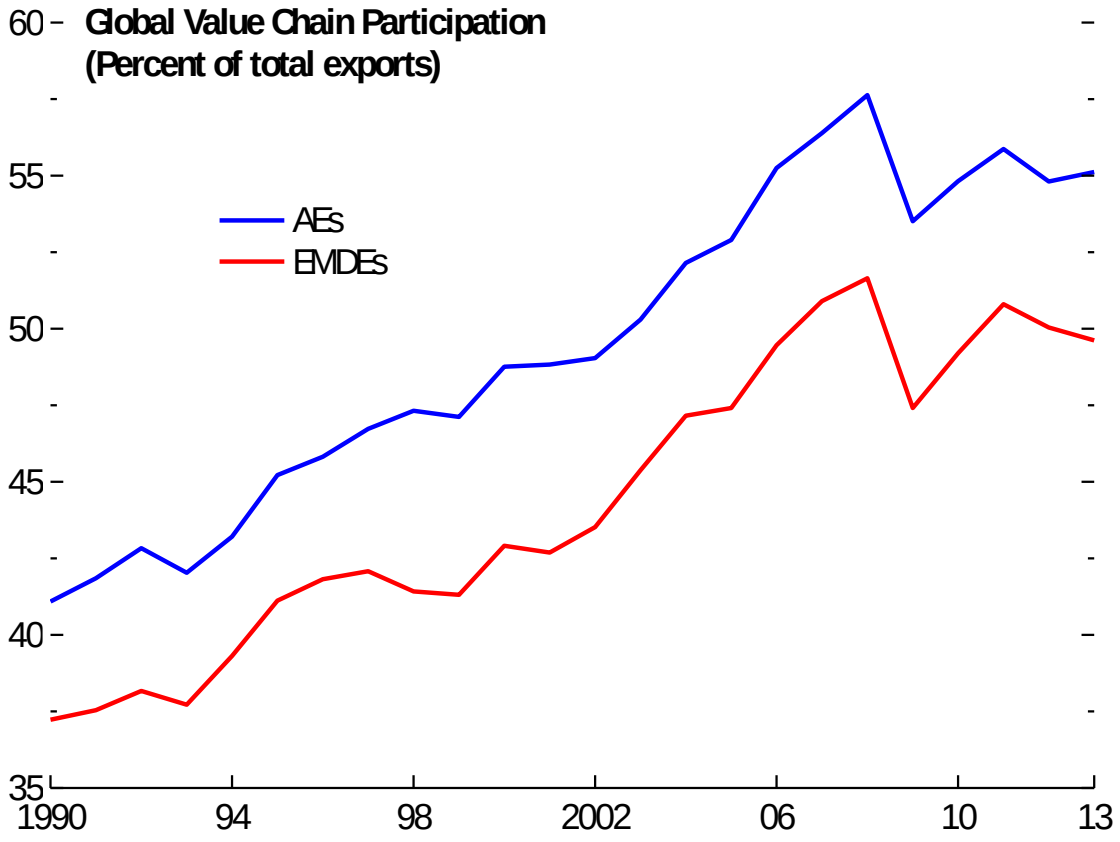
..and countries with higher initial routine exposures experienced larger declines in labor shares.

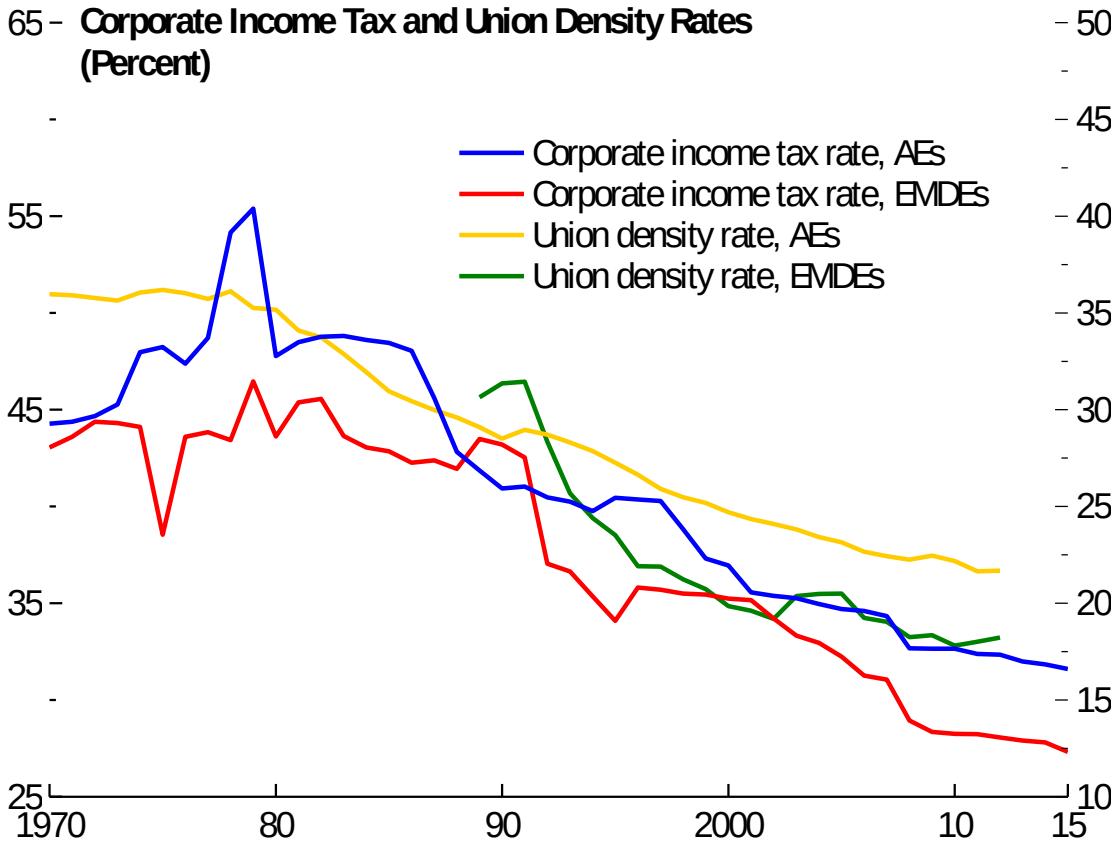
Trends in Potential Drivers of Labor Shares: Initial Routine Exposure and Changes in the Labor Share



GVC participation increased; corporate income taxes and union density rates fell.

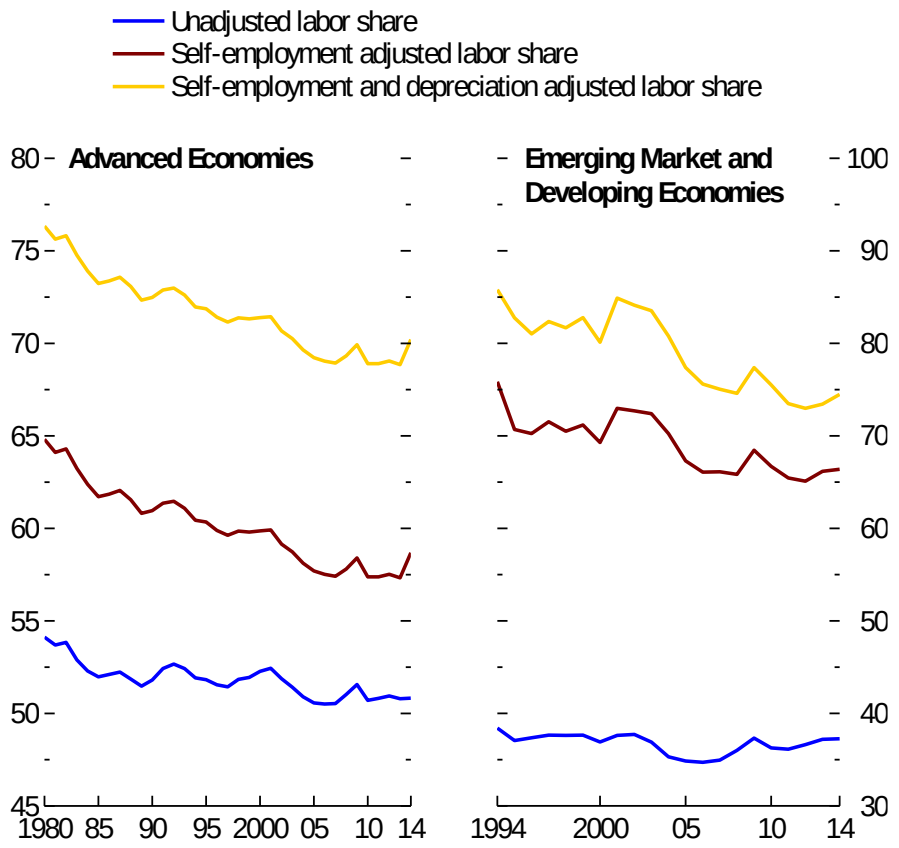
Trends in Potential Drivers of Labor Shares: Global Value Chain Participation, Corporate Tax Rates, and Union Density Rates





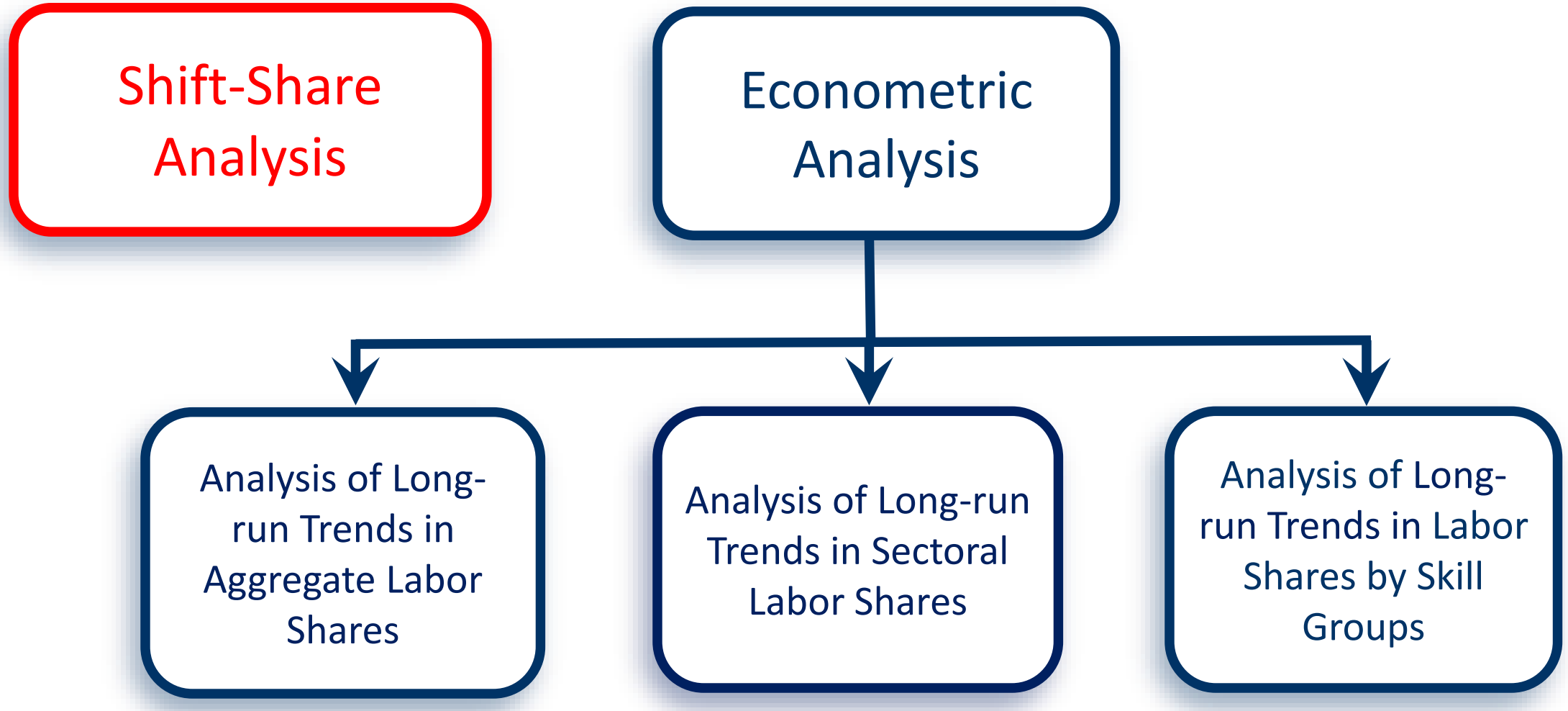
Adjustments for self-employment and depreciation affect labor share evolutions.

Evolution of the Adjusted Labor Share of Income
(Percent)



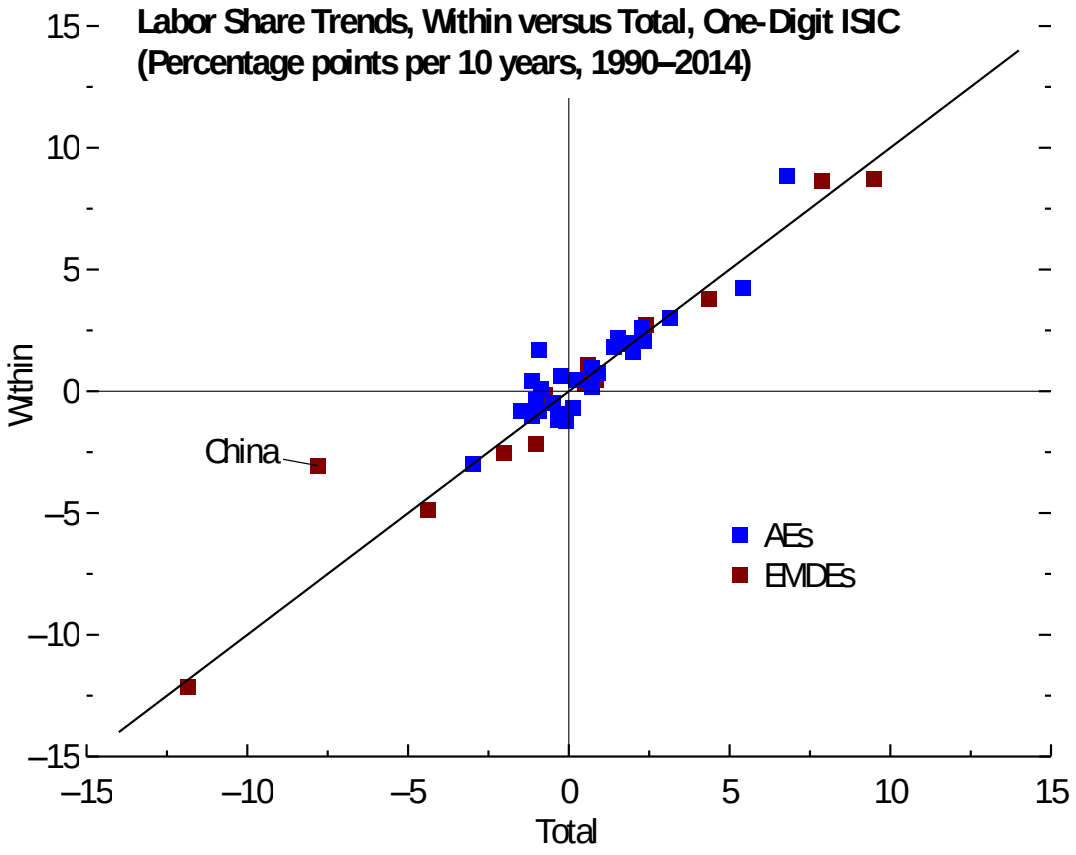
What are the key drivers of the labor share of income?

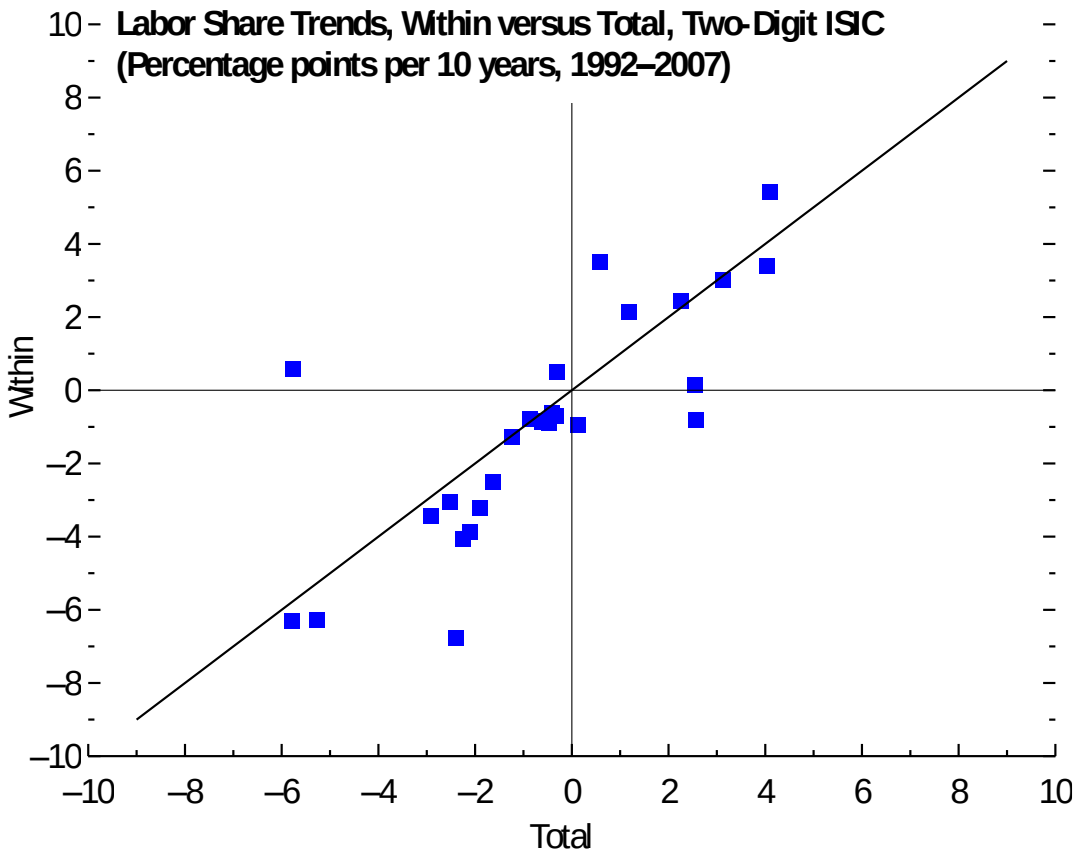
Empirical Analysis



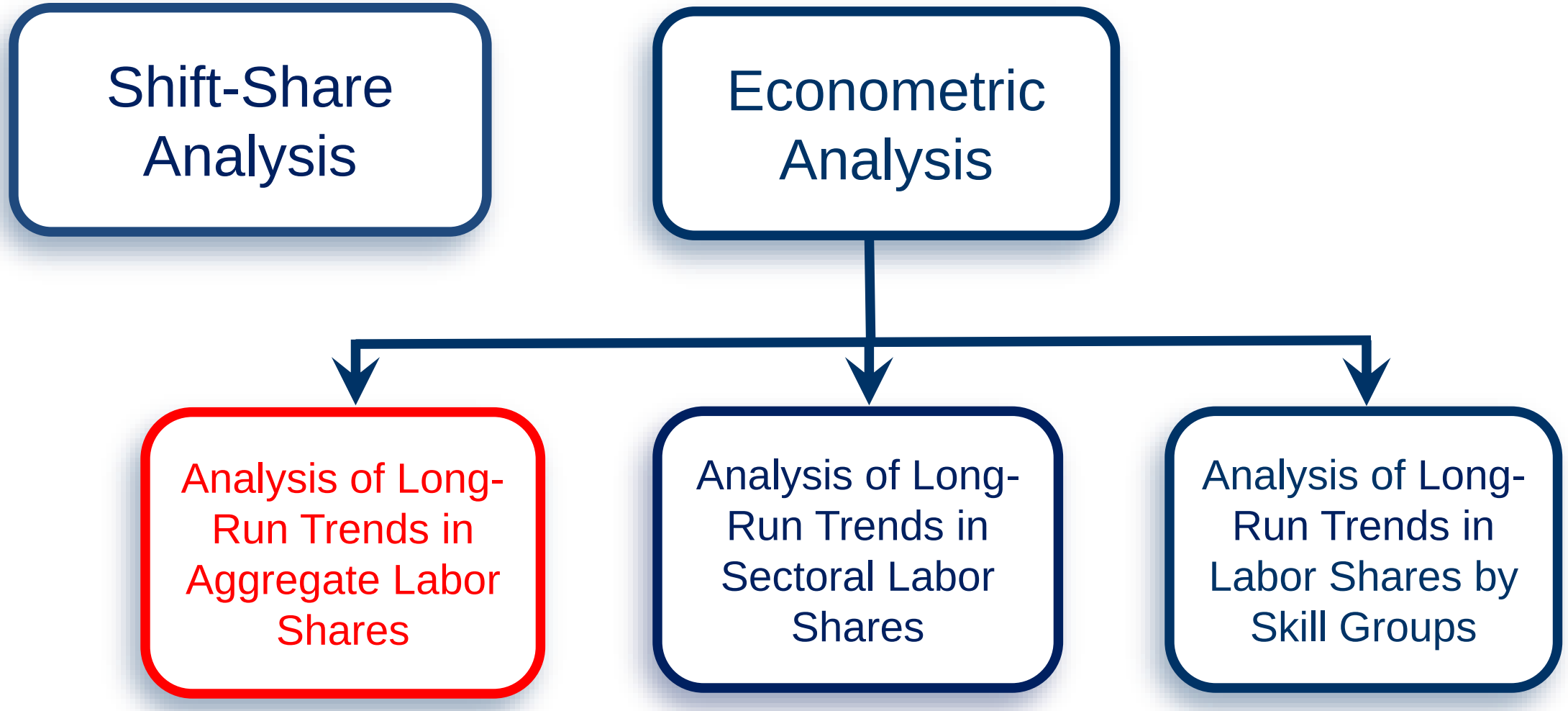
Changes in labor shares are mostly due to changes within sectors.

Shift-Share Analysis





Empirical Analysis



Analysis of long changes in aggregate labor shares

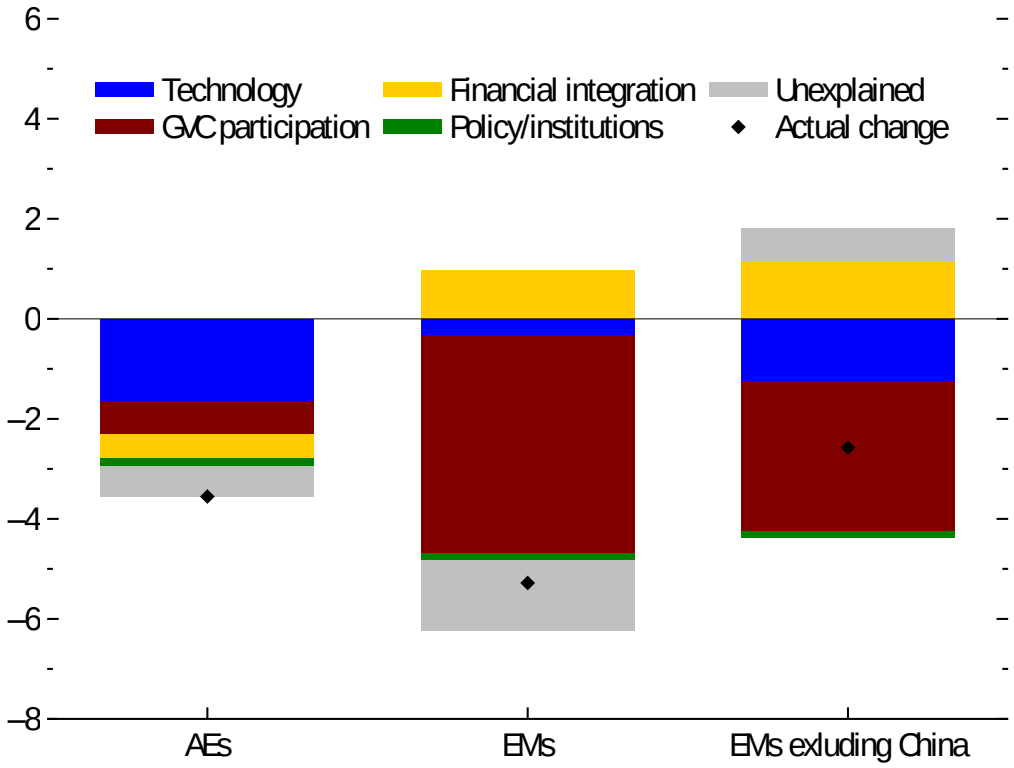
- We estimate variants of the baseline regression equation:

- $$\widehat{LS}_c = \alpha + \beta_2 \widehat{PI}_c + [\underbrace{\beta_3 RTI_{0,c} + \beta_4 RTI_{0,c}\widehat{PI}_c}_{\text{Technology}}] + \beta_1{}'\widehat{G}_c + \beta_5{}'\widehat{Pol}_c + \varepsilon_c$$

  - where (hat) variables are long-run annualized changes during 1992-2014 at the country level. (see similar approach by KN, 2013; Elsby, 2013; Acemoglu and Restrepo, 2017)
  - *PI* is the relative price of investment goods, RTI_0 the initial exposure to routine-biased technological change. Expect $\beta_2, \beta_4 > 0$, $\beta_3 < 0$
  - *G* subsumes variables measuring evolution of global integration: trade in final goods, participation in global value chains, and financial integration (sum of external assets and liabilities net of reserves).
  - *Pol* summarizes policy/institutional factors: Unionization, Corporate taxation, EPL, PMR.

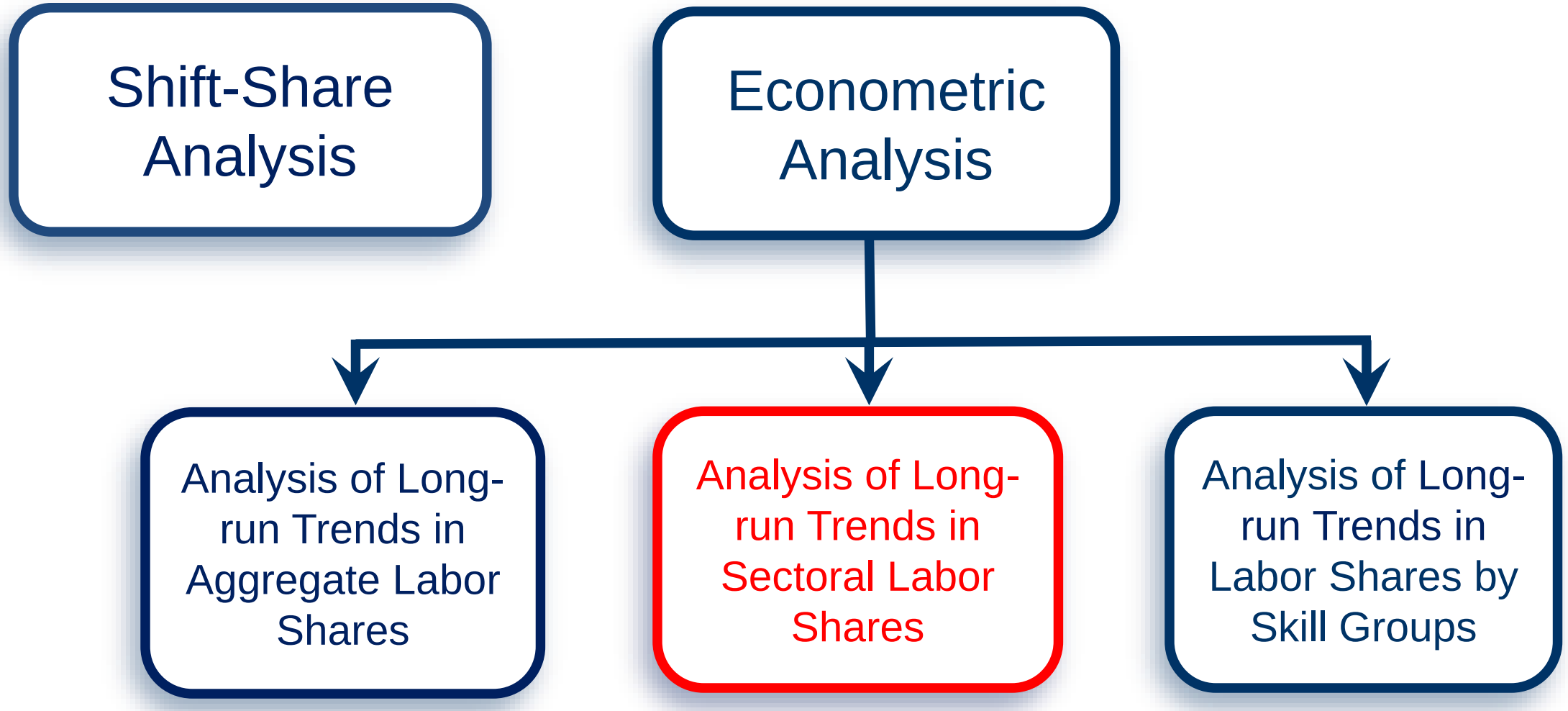
Technology is the key driver of labor shares in AEs, GVC participation in EMs.

Aggregate Results: Contributions to Aggregate Labor Share Changes, 1993–2014
(Deviation from regression constant)



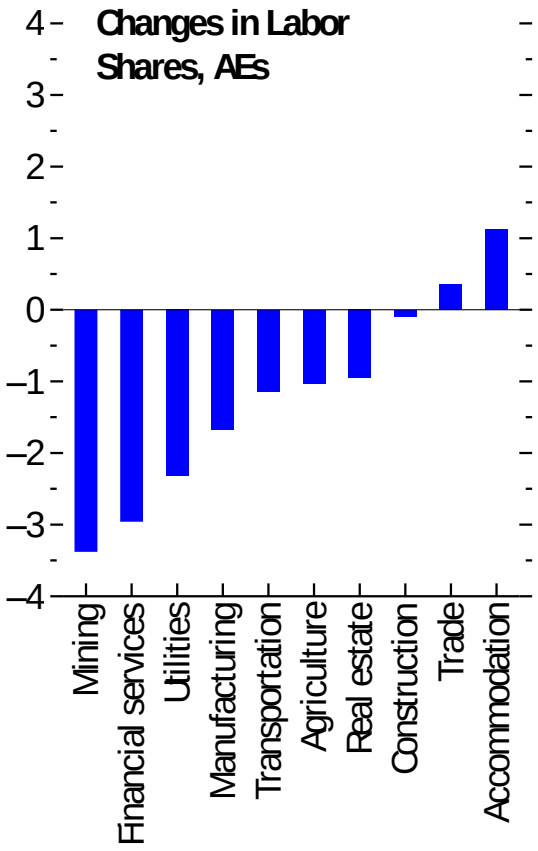
- A decline in the relative price of investment of 15 pct over 1990-2014 implies 0.4 ppt fall in LS in countries with low exposure, 1.7 ppt fall in countries with high exposure to routine-biased technological change. (Median was -3 ppt among countries with declining LS)
- An increase in intermediate trade by 4 pct of GDP (median increase in sample) implies a fall in LS of 1.6 ppt.
- Effect of corporate tax and financial integration small in comparison (or offsetting).

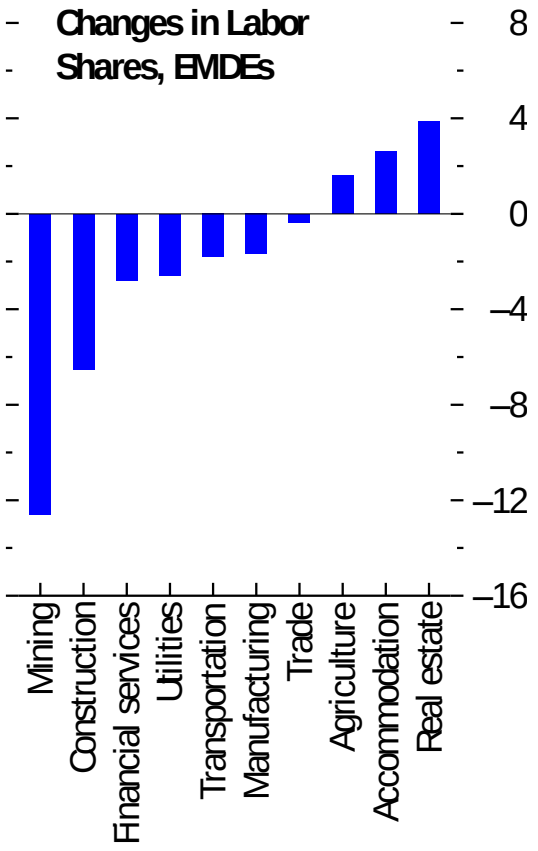
Empirical Analysis

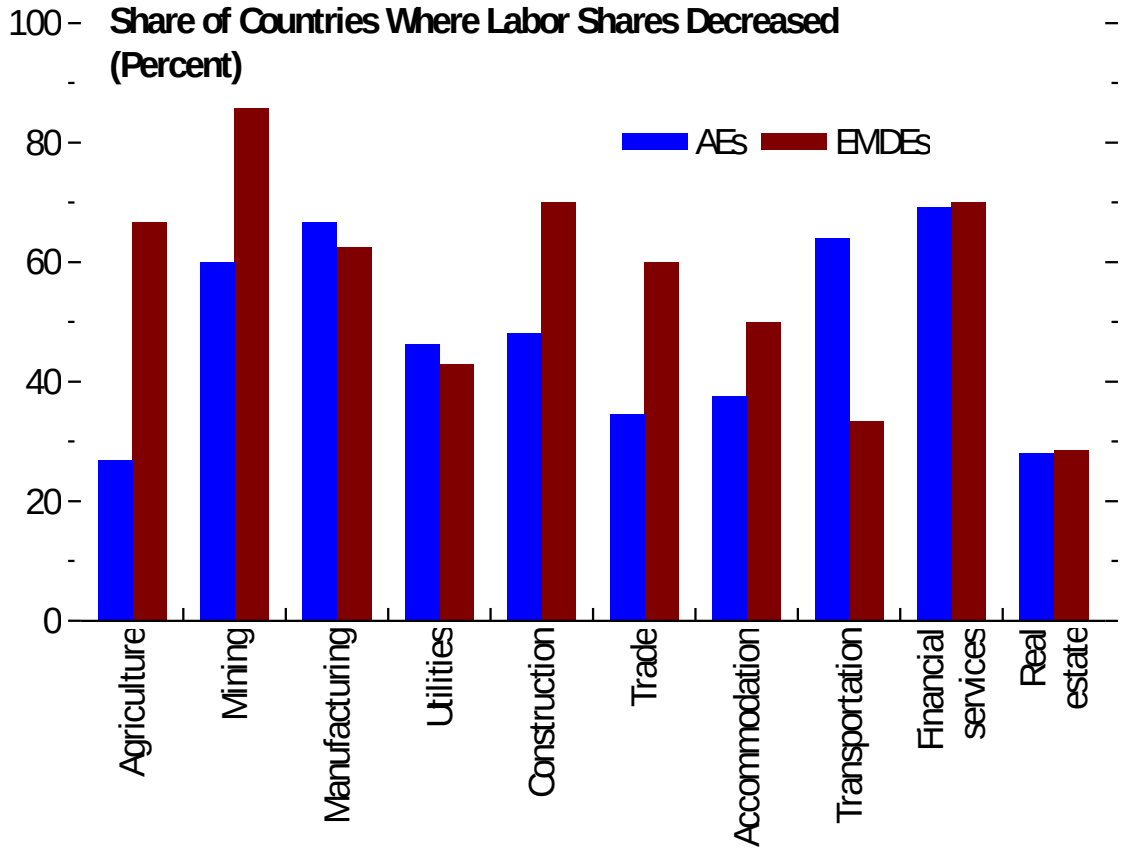


Aggregate evolutions conceal heterogeneity across sectors.

Heterogeneity across Sectors and Countries







Analysis of long changes in sectoral labor shares

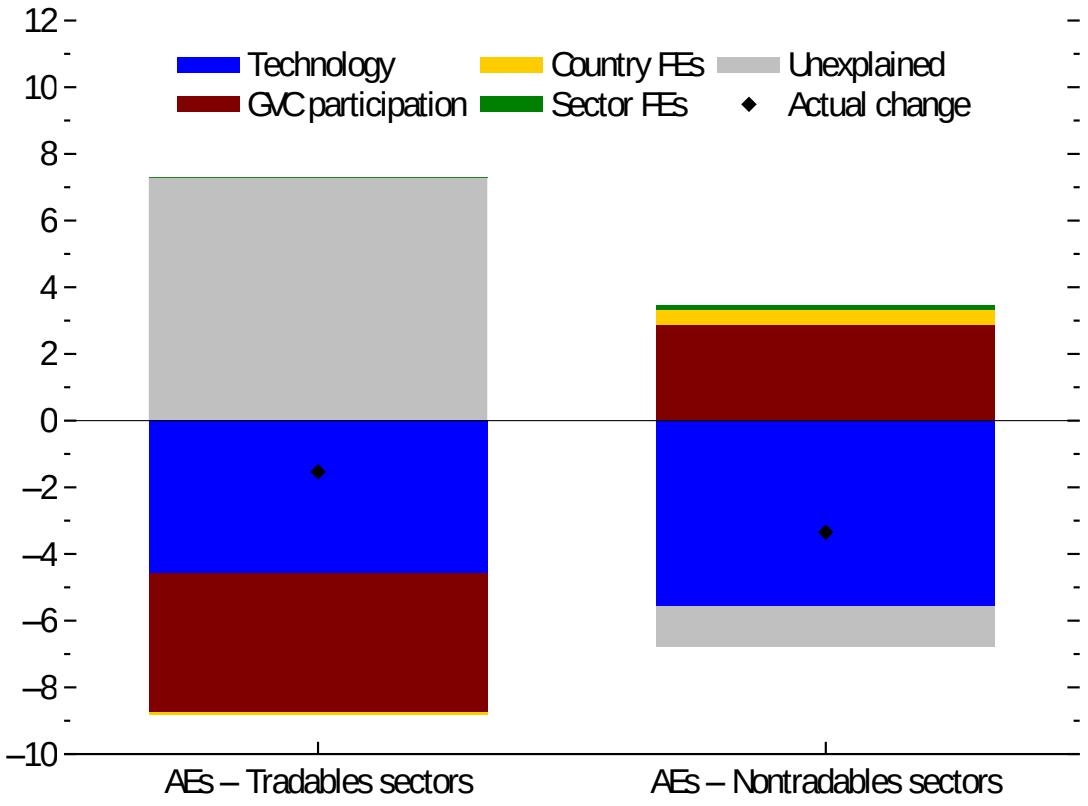
- Empirical strategy similar to analysis of aggregate labor shares.
- Link long changes in labor shares to the long changes in relative price of investment goods (PI); changes in measures of global integration (G) including final goods trade, intermediate trade, and cross-border capital mobility, and initial exposures to routinization (RTI), including in its interaction with the relative price of investment goods.

- Variants of the following cross-sectional regressions (c=1,….,C, s=1,….,S) are estimated.

$$\widehat{LS}_{cs} = \beta_1 \widehat{PI}_{cs} + [\beta_2 RTI_{0,cs} + \beta_3 RTI_{0,cs} \widehat{PI_{cs}}] + \beta_4' \widehat{G_{cs}} + \gamma_0' FE_c + \gamma_1' FE_s + \varepsilon_{cs}$$

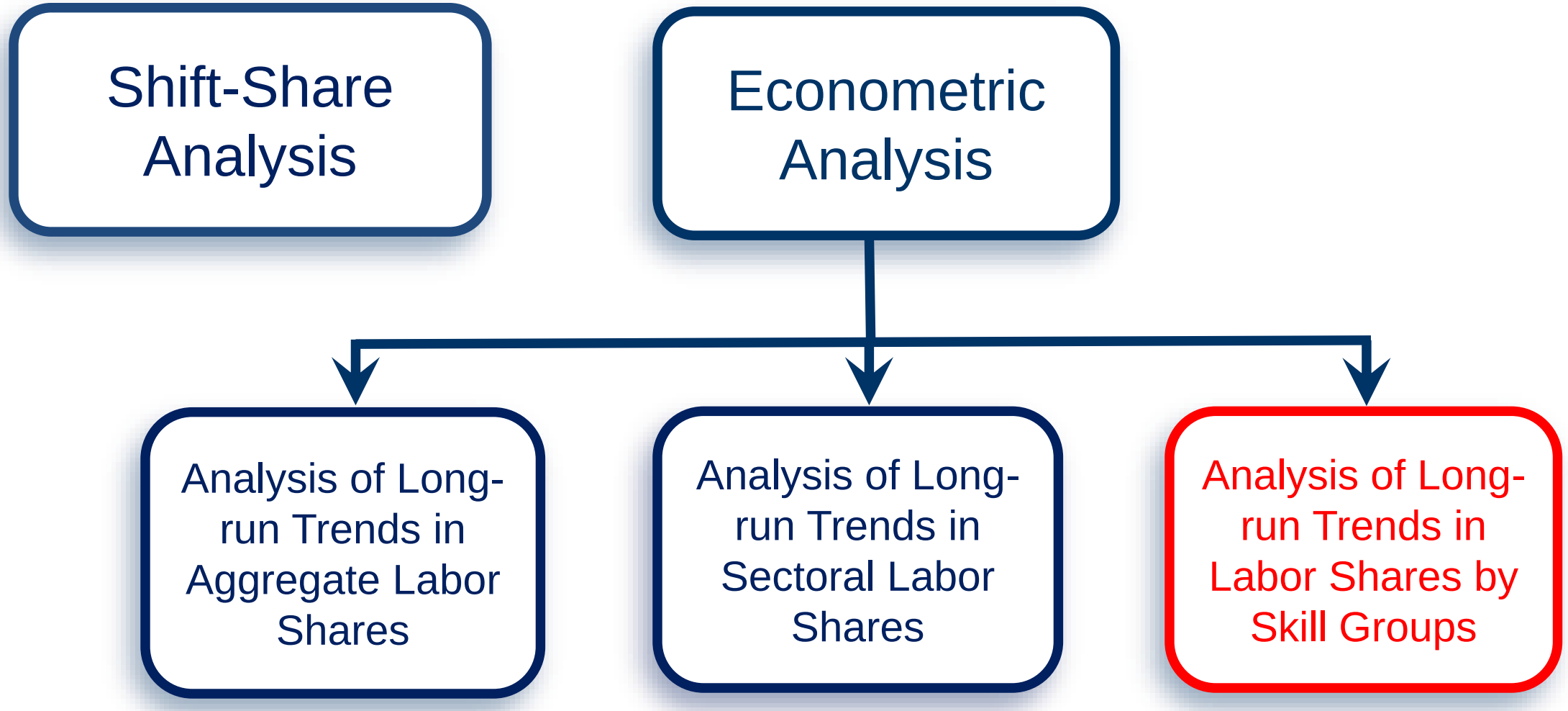
GVC participation is associated with declines in labor shares only in tradable sectors.

Sectoral Results, Advanced Economies: Contributions to Sectoral Labor Share Changes



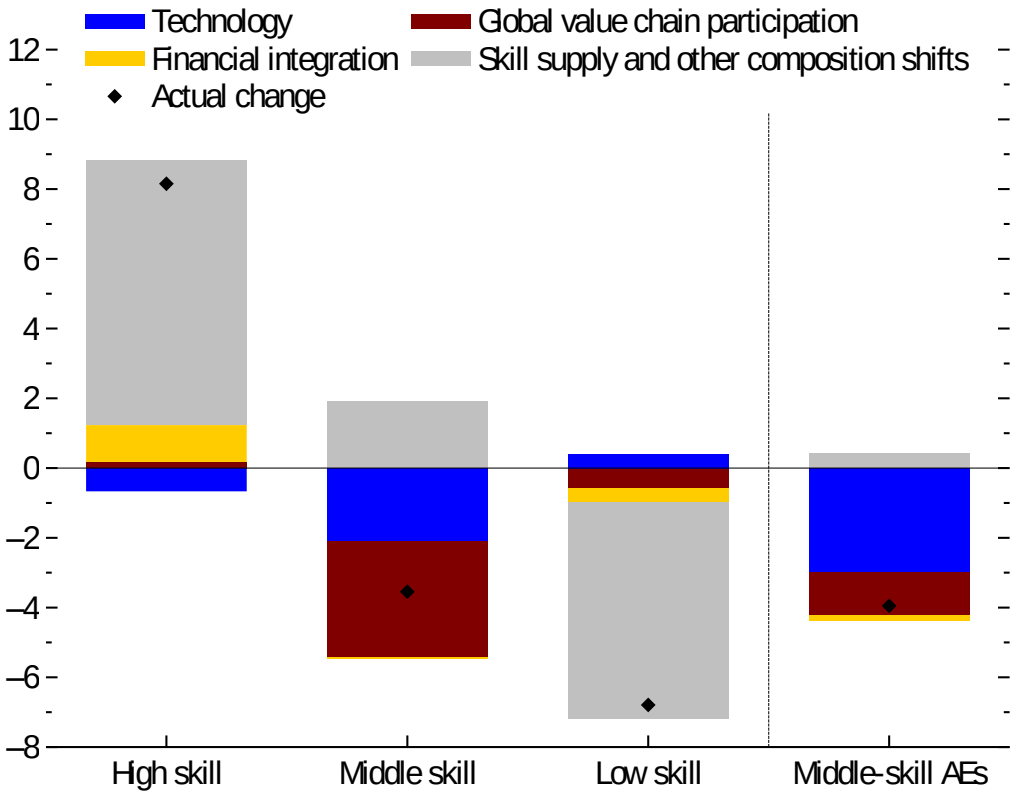
- Median decline in relative price of investment -> decline in LS observed in country-sector at the 25th percentile of routinization.
- Effect of a decline in relative price of investment is double that at the 75th percentile of routinization.
- Move from 25th to 75th percentile of routinization distribution roughly matches observed difference.

Empirical Analysis



Technological progress and GVC participation hollow out the medium-skilled.

Contributions to Aggregate Labor Share Change by Skill, 1995–2009



Conclusions

- The decline in the labor share of income in advanced and emerging market economies conceals heterogeneity across countries, sectors and skill levels, with the medium-skilled seeing the sharpest declines.
- Overall, the declines in the labor share of income are mostly due to within-sector declines not reallocation across sectors.
- In AEs, technological advancement has been the key driver of the evolution of labor shares.
- In EMs, participation in GVCs played a larger role, though could reflect benign changes.
- Technological advancement and GVC participation affected labor shares largely through their impact on middle-skilled labor.

Policy Implications

- Policies should depend on country circumstances: level of development, extent of decline in labor shares, relative importance of underlying drivers, and existing social safety nets.

- In AEs:
  - help workers cope with disruptions, including through skill upgrading and facilitating transitions,
  - long-term investment in education,
  - longer-term redistributive measures in line with social contract.

- In EMs:
  - Decline in labor share by itself may not call for policy intervention, but gains from growth should be shared more broadly.
  - Challenges similar to those in AEs could arise as automation progresses – promote skill deepening to prepare for further structural transformation.